

## **REMARKS**

The Office Action of January 28, 2009 has been carefully considered. Claims 1-11 are pending in the application, with claims 1 and 8 being the only independent claims. Reconsideration of the application in view of the following remarks is respectfully requested.

### **Patentability of the Claims**

#### **Independent Claim 1**

Independent claim 1 stands rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,798,631 (*Spee*) in view of U.S. Patent No. 4,876,637 (*Mose*).

Applicants respectfully submit that claim 1 is patentable over *Spee* in view of *Mose* because the combination does not disclose or suggest each feature recited by Applicants in claim 1.

Applicants' claimed subject matter is directed to increasing the output current of a generator, such as a wind turbine, in the event of a grid voltage drop, using a frequency converter. The frequency converter has an AC/DC converter that is coupled to a generator. A DC/AC converter is coupled to the power grid. A DC link couples the AC/DC and DC/AC converters. In order to increase the output current being supplied to the power grid in the event of a grid voltage drop, the output voltage of the DC link circuit is reduced or an operation frequency of electronic switches of the DC/AC converter is reduced. Each of these features is not disclosed by the combination of *Spee* and *Mose*.

First, *Spee* does not disclose an AC/DC converter that is coupled to a generator, a DC/AC converter that is coupled to the power grid and a DC link coupling the AC/DC and DC/AC converters. Rather, *Spee* discloses that converter 28 is "an ac/ac power

electronic converter which outputs variable voltage and variable frequency. (Col. 7, lines 11-14). The converter 38 is described as a “bidirectional ac/ac converter with input current control.” (Col. 8, lines 19-20). *Spee* speaks to “conventional electronic ac/ac conversion” and also indicates that it is possible to convert energy from one form of ac to another form of ac, without the need for link energy storage. (Col. 7, lines 47-51 and 58-61). However, Applicants’ claimed subject matter explicitly recites an AC/DC converter that is coupled to a generator, and a DC/AC converter that is coupled to the power grid, or that a DC link couples the AC/DC and DC/AC converters. Thus, it is submitted that *Spee* does not disclose or suggest each of Applicants’ claimed features, and a *prima facie* case of obviousness cannot be established.

The Examiner also states that the combination of *Spee* and *Mose* discloses reducing the output voltage of the DC link circuit in order to increase an output current being supplied to the power grid. This position is respectfully traversed.

Claim 1 recites that a decrease in the grid voltage is detected and an “output voltage” of the DC link circuit is “decreased” in order to increase an “output current” of the DC/AC converter. For the reasons discussed above, and as noted by the Examiner, these features are not disclosed by *Spee*. It is submitted that it would not be obvious to one of skill in the art to modify *Spee* in view of *Mose* to achieve the combination of features recited by Applicant in the claims.

*Spee* relates to a doubly-fed machine that maximizes the power output of the system. *Spee* discloses that the grid voltage can be disturbed at the point of common coupling due to factors associated with the grid, such as loading. (Col. 16, lines 25-27). This voltage dip or sag can be ameliorated via “appropriate control” of the converter 38.

However, there is no discussion in *Spee* related to decreasing an “output” voltage of the DC link circuit in order to increase the output current of converter 38. While *Spee* does discuss controlling the “converter 28” so as to “maximize” the active or real component of the total current at the grid interface, this power maximization is achieved using both converter frequency and current. (Col. 15, lines 53-58.) *Spee* also discusses controlling the current in converter 28 to optimize the reactive power at the grid interface. (Col. 15, lines 63-65) and current control of converter 38 to provide for reactive power control at the grid. (Col. 16, lines 12-14). It is also noted that *Spee* discloses that converter 38 is not responsible for this power optimization, but provides for the suitable energy transfer between converter 28 and the grid via the link 32. (Col. 8, lines 56-58).

The Examiner notes that *Spee* does not disclose or suggest reducing either a DC link voltage or an operation frequency of electronic switches of the DC/AC converter to increase the output current of the DC/AC converter as is claimed, and looks to *Mose* for these features. Specifically, the Examiner states that *Mose* discloses controlling an inverter 4 to decrease the DC link voltage in order to increase the output current to the load. This interpretation is respectfully traversed.

First, *Mose* relates to a power converter that converts AC input power into AC output power to which a load is connected. (Abstract, lines 1-2). *Mose* is concerned with the situation where the AC input power is interrupted and not a situation of a “grid voltage drop” as is recited by Applicant in the claims. The power converter of *Mose* provides a “countermeasure against instantaneous power interruption. (Col. 1, lines 7-10). Col. 5, lines 62-64 of *Mose*, referred to by the Examiner states that “upon power restoration” the frequency and phase of inverter 4 is controlled to decrease the DC

voltage  $V_{dc}$ , thus increasing input current  $I_{ac}$  to load motor 5. There is no disclosure here or elsewhere of a grid condition where the grid voltage decreases by at least a predetermined amount and the input power is constant. Rather, *Mose* addresses the situation of suppressing a reduction in motor speed during power interruption (Col. 2, lines 28-32). *Mose* is not concerned with, and does not address the problem of increasing an output current in response to a grid voltage drop as is the case in Applicants' claimed subject matter.

Although the case of *KSR International Co. v. Teleflex Inc. (KSR)*, 550 U.S. 398, 82 USPQ2d 1385 (2007), clarified the framework for the rejection of claims based on obviousness under 35 USC §103(a), an operative question is "whether the improvement is more than the predictable use of prior art elements according to their established functions." *Id.* at 417, 82 USPQ2d at 1396. (from MPEP 2141). There must also be some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention. (MPEP 2141, III(G)). In this case, it is submitted that the "predictable use" of the prior art elements does not lead to Applicants' claimed subject matter and because of the disparate nature of the different technology areas represented by each reference, there is no motivation to combine the references.

In Applicants' claimed subject matter, a drop in grid voltage is sensed. The generator of the wind energy turbine is used to support the grid so that the required electrical power is generated and supplied to the grid. To do this, the output voltage of the DC link circuit is controlled by controlling the AC/DC converter, and thus the output current of the DC/AC converter can be increased. *Spee* discloses a different system

configuration and *Mose* addresses an entirely different problem, which is that of “power interruption”. It is submitted that one of skill in the art would not be motivated to look to *Mose* in an effort to achieve Applicants’ claimed subject matter, without hindsight knowledge of Applicants’ disclosure. Given the disparities in the fields of technology and endeavor represented by *Spee* and *Mose*, one of skill in the art would not be motivated to combine *Spee* and *Mose* to achieve Applicants’ claimed subject matter, and, and even if they did, significant experimentation and modification would be required in an effort to achieve the subject matter recited by Applicant in the claims.

Thus, in view of the foregoing, it is submitted that the combination of *Spee* and *Mose* does not disclose each and every element of Applicants’ claimed subject matter. There is also no motivation to combine *Spee* and *Mose*, and the references address very different problems. Therefore, a *prima facie* case of obviousness under 35 USC §103(a) is not established and claim 1 is allowable.

#### Independent Claim 8

Independent claim stands rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,798,631 (*Spee*) in view of U.S. Patent No. 5,483,127 (*Widmayer*).

Applicants respectfully submit that claim 8 is patentable over *Spee* in view of *Widmayer* because the combination does not disclose or suggest each feature recited by Applicants in claim 8.

As noted above, *Spee* does not disclose or suggest each element recited in the claims. The Examiner notes that *Spee* does not disclose or suggest at least the feature of reducing an operation frequency of electronic switches of the DC/AC converter for increasing the output current of the DC/AC converter. It is respectfully submitted that *Widmayer* does not overcome this deficiency.

*Widmayer* relates to a fluorescent lighting control system. This system is different than a system for controlling power to a public power grid as is claimed by Applicants. In *Widmayer* a signal produced as a result of a sensed ambient light level is used to control the frequency of an oscillator. (Col. 13, lines 3-4). The oscillator controls the on-off periods of electronic switches driving at least one fluorescent GDL and its current limiting ballast element. (Col. 13, lines 4-6). The frequency of the switching controls the time period for the current to flow in the lamp ballast series combination. This controls the current amplitude. (Col. 13, lines 7-11). Figure 5 illustrates this arc current function. Although *Widmayer* discloses controlling a switching frequency to control a time period for current to flow in the lamp ballast combination, this is not related to detecting a decrease in a grid voltage of a public power supply. The variable arc lighting system of *Widmayer* is not concerned with detecting a drop in voltage of the lamp ballast combination, but rather, lowering a power output in order to conserve energy. (Col. 12, lines 31-59). An increase in the current allowed to flow in the lamp ballast combination will be in response to sensing that the ambient light level has decrease-i.e., the room has gotten darker and more light is required. (Col. 13, lines 1-10). This is not the same as detecting a decrease in grid voltage as is recited in Applicants' claims.

It is submitted that *Spee* and *Widmayer* are not analogous art and not combinable for purposes of 35 USC §103(a). MPEP 2141.01(a) states that "under the correct analysis, any need or problem known in the field of endeavor at the time of the invention and addressed by the patent [or application at issue] can provide a reason for combining the elements in the manner claimed." *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398, \_\_\_\_, 82 USPQ2d 1385, 1397 (2007). Thus a reference in a field different from that of

Applicants' endeavor may be reasonably pertinent if it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his or her invention as a whole." Neither *Spee* nor *Widmayer* address the problem of supplying electrical power to a public power grid upon detecting a grid condition where the grid voltage decreases, the references do not provide any reason to combine the references to achieve Applicants' claimed subject matter. *Spee* deals with the situation of an input power interruption where a doubly fed machine is used to maximize output power to the system. *Widmayer* is concerned with controlling a fluorescent lamp at less than rated wattage in order to conserve energy. (Abstract, lines 1-4). *Widmayer* does not disclose or suggest detecting a decrease in a public power grid voltage and upon detection of the grid condition, reducing an operation frequency of electronic switches in order to increase the output current is increased as is recited by Applicants in claim 8. Thus, it is respectfully submitted that *Spee* and *Widmayer* are in different fields of endeavor, the references are not reasonably pertinent to Applicants' claimed subject matter and would not "logically" commend themselves to an inventor's attention in considering his or her invention as a whole.

#### Dependent Claims 2-7 and 9-11

Dependent claims 2-7 and 9-11 are allowable for at least the same reasons that independent claim 1 or 8 is allowable, as well as for the additional limitations recited therein.

The indicated allowability of claim 7 is noted with appreciation.

### **Conclusion**

In view of the foregoing, Applicants respectfully submit that the application is in condition for allowance, and such action is respectfully requested.

Respectfully submitted,

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